

T08D05 – (18.2) Buffer Solutions Notes

Name

1. 18.2.1 Describe the composition of a buffer solution and explain its action. (3)
- a. What is a buffer solution?

- b. What types of processes need to resist change in pH?

- c. There are three different types of buffers, describe each below:

	What are they Prepared from	An example:
Acid Buffers		
Basic Buffers		
Neutral Buffers		

- d. The action of a buffer – **Acidic Buffers:**

- i. Write the equations that go along with the example from above using ethanoic acid and its salt:

- ii. If an **acid is added** to this solution, what happens?

- iii. If a **base is added** to this solution, what happens?

- e. The action of a buffer – **Basic or Alkaline Buffers:**

- i. Write the equations that go along with the example from above using ammonia and its salt:

- ii. If a **base is added** to this solution, what happens?

- iii. If an **acid is added** to this solution, what happens?

- f. Derive the Henderson-Hasselbalch equation:

- i. Equation for the equilibrium of a weak acid:

- ii. The acid dissociation constant expression:

- iii. If we rearrange:

- iv. Taking the negative log of both sides, we find the Henderson-Hasselbalch equation as:

v. What does the Henderson-Hasselbalch equation indicate?

g. The Characteristics of a Buffer are:

i. Dilution:

ii. Buffering Capacity:

2. 18.2.2 Solve problems involving the composition and pH of a specified buffer system. (3)

a. **Calc #1 – pH of a Buffer:** Calculate the pH of a buffer containing 0.20 moles of sodium ethanoate in 500cm³ of 0.10 mol dm⁻³ ethanoic acid. K_a for ethanoic acid is 1.8×10^{-5}

b. **Calc #2 – Mass of Required Salt:** Calculate the mass of sodium propanoate ($M = 96.07 \text{ g mol}^{-1}$) that must be dissolved in 1.00dm³ of propanoic acid ($pK_a = 4.87$) to give a buffer solution with pH of 4.5.

c. **Calc #3 – pH of Buffer after base is added:** A buffer contains 0.20mol of sodium ethanoate in 500cm³ of 0.10 mol dm⁻³ ethanoic acid. K_a for ethanoic acid is 1.8×10^{-5} : Calculate the pH after 0.025 moles of sodium hydroxide is added